REMARKS

Claims 1 – 36 are pending in the subject application. Claims 1 – 4 and 7 – 30 stand rejected, claims 5 and 6 are indicated as containing allowable subject matter, and the status of claims 31-36 is unknown, since the Examiner erroneously did not address these claims in the Office Action. Favorable reconsideration of the application and allowance of all of the pending claims are respectfully requested in view of the following remarks.

Dependent Claims 31-36 Were Not Address In the Office Action

In the Amendment filed May 1, 2006, Applicant introduce six new dependent claims, which contain certain limitations similar to those found in the allowable claims. In the subject Office Action, the Examiner failed to examiner or even acknowledge these claims.

Specifically, Applicant added dependent claims 31 (31/1), 33 (32/26), and 35 (35/29), which require applying a single phase adjustment to each of the digital baseband signals, wherein the single phase adjustment jointly accounts for both beamsteering phase rotation and carrier phase rotation. Further, Applicant added dependent claims 32 (32/1), 34 (34/26), and 36 (36/29) which require generating a stream of combined phase adjustments by summing a stream of carrier phases for the digital baseband signals with a stream of beam rotation phases for the digital baseband signals, and adjusting phases of the digital baseband signals in accordance with the combined phase adjustments. Note that the limitations in these new dependent claims are somewhat similar to certain limitations found in allowable claim 5 in that the beamsteering and carrier phase are combined and jointly applied to the digital baseband signals.

Note that these claims were added in response to a non-final Office Action and therefore should have been entered and considered; thus, the Office Action is incomplete. Accordingly, the Examiner is respectfully requested to provide Applicant with a corrected Office Action in which these claims are considered.

Prior Art Rejections

The prior art rejections in the present Office Action are identical to those in the previous Office Action. Specifically, claims 1 and 22 – 25 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,615,024 to Boros et al. Further, claims 2 and 3 stand rejected as being unpatentable over Boros in view of U.S. Patent No. 5,583,562 to Birch et al.; claim 4 stands rejected over Boros, Birch, and U.S. Patent No. 6,768,458 to Green et al.; claims 7 – 10 stand rejected over Boros and U.S. Patent No. 6,831,943 to Dabak et al.; claims 11 – 13 stand rejected over Boros and U.S. Patent No. 6,549,527 to Tsutsui et al.; claims 14 – 16 and 18 stand rejected over Boros and U.S. Patent No. 5,809,422 to Raleigh et al.; claim 17 stands rejected over Boros and U.S. Patent No. 5,937,348 to Cina et al.; claims 19 – 21 stand rejected over Boros and U.S. Patent Application Publication No. 2002/0141478 to Ozluturk et al; and claims 26 – 30 stand rejected over U.S. Patent No. 6,101,399 to Rayleigh in view of U.S. Patent No. 5,631,898 to Dent and U.S. Patent No. 6,072,994 to Phillips et al. Applicant again respectfully traverses these rejections for the reasons set forth in the Amendment of May 1, 2006, which are incorporated herein by reference.

In response to the Examiner's rebuttal arguments presented on page 2 of the Office Action, Applicant offers these additional remarks. In essence, the Examiner's position is that the process of beamforming inherently includes adjustments of carrier phases of signals being transmitted/received by antenna elements; thus, Boros' mere teaching of digital beamforming encompasses both beamforming phase rotation and carrier phase rotation as claimed.

Applicant respectfully disagrees. A digital baseband signal cannot be transmitted by an RF transmitter unless an RF carrier signal is applied to the digital signal via phase rotation. Since the RF carrier signal is generally the same for all antenna elements, the RF carrier signal is generally applied to a common baseband signal (separately from the beamforming phase adjustments). This common RF-modulated digital signal can then split into a plurality of signals corresponding to individual antenna elements, and the various different phase shifts associated with the different antenna elements can then respectively be applied to the plurality of signals. Likewise, upon reception of a signal via an array of antenna elements, the beamforming phase

rotations are generally removed from the individual signals, and the signals are then combined into one composite signal before downconverting to baseband (i.e., removing the carrier phase from the composite digital signal). There is nothing in Boros' disclosure that suggest anything different from this conventional approach.

As explained in Applicant's specification, it is unknown in digital beamforming to apply a carrier signal to a digital baseband signal on an element-by-element basis, primarily because in typical architectures this approach would result in unnecessary processing (i.e., the carrier phase is the same for all antenna elements). For reasons explained in Applicant's specification, this is not the case with Applicant's architecture. Likewise, it is unknown to remove the carrier phase from digitized received signals on an element-by-element basis, since typical architectures involve combining the signals from the various antenna elements once the beamforming phases have been removed.

The relevant portion of Boros' disclosure is found in column 13. There is simply nothing in Boros' disclosure that suggests that a shared baseband processor receives both modulated outbound digital baseband signals and incoming digital baseband signals, and applies phases to these digital baseband signals to account for both beamforming phase rotation and carrier phase rotation of individual antenna elements. Simply applying or removing the beamforming phase rotation will not also cause the underlying carrier phase to be applied or removed, and there is certainly no suggestion that Boros handles the carrier phase in any manner different from the conventional approach.

Moreover, the claimed shared baseband processor handles both output digital baseband signals and incoming digital baseband signals, as is evident from Fig. 1. More specifically, the same processor jointly applies carrier phase rotation weights and beam rotation weights to both outbound transmission signals and incoming received signals. There is simply no device or structure within Boros' system that operates in this manner. As is clear from Figs. 1, 4, and 6 and column 13 of Boros, received signals are downconverted and processed in a receiver chain including functional blocks 109 and 11, and the transmit signals are processed and upconverted in a transmitter chain including blocks 123 and 125. Boros' transmit weight generator does not

apply phases to anything – it merely assesses incoming signals and provided feedback for beamsteering to the transmitter. There is simply no shared processor in Boros' system that operates in the manner claimed.

The Examiner notes that the language of the claim does not limit the carrier phases to being different for each individual antenna element. This is because the carrier phase rotation (absent the additional beamforming rotation) is *not* necessarily different for the various antenna elements! That is the reason why conventional architectures such as that in Boros do not apply the carrier phase rotation on an element-by-element basis – it would result in considerable additional unnecessary processing. However, as explained on page 9, lines 14-20, while Applicant's approach results in increased baseband computational complexity by a factor of the number of antenna elements, this approach affords significant performance advantages to each user channel.

Finally, Applicant notes that Boros contains no description of anything analogous to the limitations found in claims 31-36, which have not been considered by the Examiner.

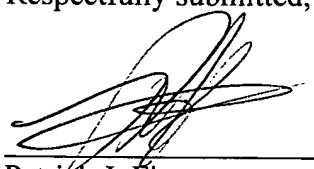
With regard to claims 26-29, Applicant again notes that these claims include requirements comparable to those found in claim 1. In particular, these claims require applying phases to the digital baseband signals in a serial stream to account for both carrier phase tracking and antenna element beamforming, where the digital baseband signals in the serial stream are associated with individual antenna elements. In other words, both the carrier phase rotation and beamforming phase are applied to signals associated with individual antenna elements. This claim requirement is simply not disclosed or suggested anywhere in Rayleigh, Dent, and Phillips, and the Examiner's arguments do not address this point. Thus, for the foregoing additional reasons and for the reasons previously of record, Applicant respectfully requests the Examiner to reconsider and withdraw the rejections of claims 1-30.

In view of the foregoing, Applicant respectfully requests the Examiner to find the application to be in condition for allowance with claims 1 – 36. However, if for any reason the Examiner feels that the application is not now in condition for allowance, the Examiner is

respectfully requested to call the undersigned attorney to discuss any unresolved issues and to expedite the disposition of the application.

Filed concurrently herewith is a Petition (with payment) for an Extension of Time of Two Months, together with a Notice of Appeal. Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee for such extension is to be charged to Deposit Account No. 05-0460.

Respectfully submitted,



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